ABSTRACT

System and methods are provided based on optimization of the weighted log-likelihood. These systems are able to efficiently track dominant sinusoidal components of a real signal in Gaussian noise, provided that the number of the components is known. The algorithm is implemented using simple parallel building blocks involving narrow-band filters that are adaptively self-tuned around the frequencies of the signal components. The algorithm has low computational complexity and provides high estimation accuracy and is also able to track chirp signals. The algorithm is flexible enough to be adjusted to operate in different environments such as for speech signals, by selecting a proper window function. Simulation results confirm that the proposed algorithm is reliable in tracking the frequencies as well as in estimation of the amplitudes of the components. In a chirp environment, the algorithm is able to recognize some frequency cross-overs as long as the amplitudes are different enough around the cross-over moment. Simulations show that the LIR of the algorithm is not affected by the SNR and is inversely proportional to the window length. The effects of the length and type of the window on the frequency resolution and the LIR of the algorithm are discussed. The algorithm is efficiently capable of decomposing speech voiced signals.